micromarkets

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ABSTRACT

To overcome constraints of current marketplaces and e-commerce sites we propose an open, flexible framework for user-centered marketplaces. This framework brings together rational user, which can exchange values like goods and services based on the principles of peer-to-peer networks. Any agent can easily create different markets in a modular fashion. By means of this, any agent can take part in diverse, independent and highly customized markets, which we call "micromarkets".

1 Introduction

To overcome constraints of current marketplaces and e-commerce sites we propose an open, flexible framework for user-centered marketplaces. This framework brings together rational user agents (Simon, 1959), which can exchange values like goods and services based on the principles of peer-to-peer networks. Any agent can easily create different markets in a modular fashion. By means of this, any agent can take part in diverse, independent and highly customized markets, which we call "micromarkets".

2 Constraints of current e-markets

Current electronic markets and e-commerce sites suffer from a number of constraints and complications (Youll, 2001): First one can find a segregation of markets. Traders in a particular market cannot see potential trading partners in other markets, thus their access to truly comprehensive product and price information is limited.

Furthermore, markets suffer from inflexibility, because usually the markets determine how and when traders may trade. Competing for profit electronic markets distinguish themselves through proprietary, incompatible trading mechanisms.

Another constraint is the limitation to monolithic transaction models: E-commerce systems, and the latest e-commerce standards, generally presume that all transactions are sales involving only two parties: a "buyer" and a "seller".

Moreover, the support for automation is usually weak. Current electronic markets typically transfer offline human-run trading to online forums and do not support automation of nontrivial strategies. The last constraint of electronic markets to be mentioned in this paper is the reliance on price-based matching: Despite empirical findings in that customer awareness, branding and trust, not price, drive Internet purchase decisions, the predominant auction mechanisms use price as the key deciding factor in awarding sales.

3 The Model of Media and Business Media

The model of media (Schmid, 1997) guides our analysis and design of communities and their media, of business models and system architectures, and of communication and service design.

Media are considered as multi agent systems (see), which consist of a channel system for the transport of information over space and time, a logic, for capturing syntax and semantics of the information and an organizational system (roles and protocols) for structuring the behavior of its agents (Lechner & Schmid, 2001).
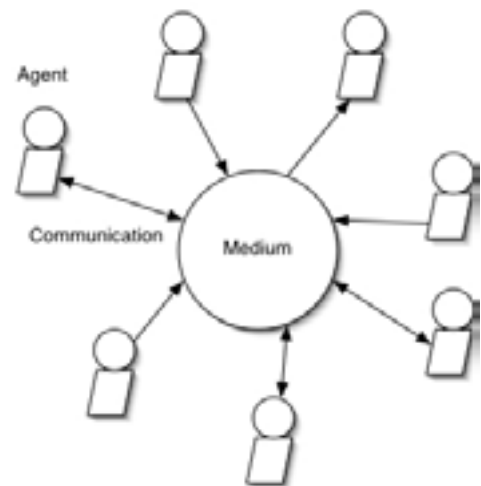

Figure 1: Media as Sphere for Communities of Agents

Electronic markets can be viewed as Business Media (Schmid & Zimmermann, 1988). This is a holistic approach that brings together technological, communicational, business, and managerial issues. Business Media are considered as transaction-based Media providing the means for the creation and exchange of values like goods and services between independent agents. Four kinds of communication acts are distinguished, following the phases of a transaction: In the *Knowlegde Phase*, agents exchange information and they establish their knowledge or belief. In the *Intention Phase*, agents

signal intentions, developed from the knowledge provided in the knowledge phase and by the linguistic means of the common logical space, following their role and the protocols. In the *Contracting Phase*, agents negotiate contracts. The messages in this phases are binding, in the sense that they oblige agents to act as indicated. This phase ends – in the case of success – with a contract. In the *Settlement phase*, agents act according the negotiated contract. In commerce, this means, e.g., shipping of goods and transaction of money.

4   micromarkets

Using the Business Media model we have developed a software platform, "micromarkets", which provides a basis for modeling and investigating open market environments for rational agents. The platform consists of a basic service, which acts as a meta-engine for Business Media (see).
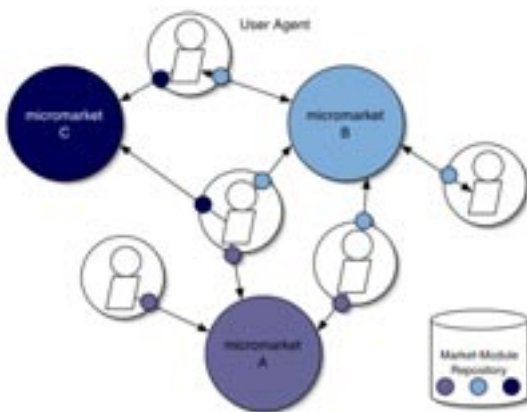

Figure 2: micromarkets platform

Using a well-defined communication interface, agents can use services provided by the "micromarkets" platform to conduct economic transactions on a peer-to-peer basis. Market modules define the trading rules in form of a trading protocol and descriptions of products and services. These modules are provided as XML-based documents and can be used by the agents to conduct their business. Any two or more agents using the same market module can trade with each other. In the case that other trading rules are desirable or different product specifications are needed, nothing more than a new or modified market module has to be provided to the community of agents.

The "micromarket" platform offers a lot of desirable characteristics of marketplaces not found in the traditional electronic markets (Youll, 2001): Due to the peer-to-peer concept it is an open platform:

Search costs are the expenses of meeting a new trading partner or learning the price of a good or service. In an open electronic marketplace, rational agents can reduce search costs to nearly zero.

Furthermore, the "micromarkets" platform allows for flexible trading rules and multi-attribute negotiation of

product specifications: As the trading protocols and the specification of goods and services are encapsulated in separate modules, they can be easily adapted and distributed by any participating agent. This allows the participated parties to tailor their transactions to their needs. Besides, the platform is especially well suited for being automated by software agents. The agents will share a common functional design, but a unique strategy module that is part of the design allows each agent to pursue an individual strategy. This offers rich opportunities to have human users assisted by artificial agents acting on their behalf.

5   Results and further research

We expect that the most successful marketplaces will be the ones that have the lowest barriers of entry and provide the best "quality of service" guarantees in terms of security, fairness and efficiency. As the latter quality of service guarantees are easily to provide in closed, centralized environments, they are becoming a real challenge in systems of independent, distributed agents. In (Dellarocas & Klein 1999) it is argued that the most important challenges to cope with are heterogeneity, limited trust, the possibilities of systemic failures and the need for rapid adaptation to dynamic changes of the environment. Following the concept of civil agent societies we are currently extending the micromarkets platform by the three core services proposed in (Dellarocas & Klein 1999): The *socialization service*, which is an enhanced version of the registration process of other agent environments. During this process, the agent is engaged in explicit negotiation concerning the agent's capabilities and the markets rules and norms. A *notary service*, which is contacted whenever a set of agents intends to engage in a transaction that requires protection of the market. Finally, an *exception handling service* which monitors the market for dysfunctions and tries to resolve their causes.

At the moment we are testing and improving the "real-life" applicability of the platform by implementing different market scenarios: e-procurement, financial asset management, human resources and fun markets, like a blind-date market, and staffing of projects have already been successfully realized on a prototype basis.

6   Acknowledgements

7   References

Dellarocas, C. and Klein, T. M. (1999), *Civil Agent Societies: Tools for inventing open agent-mediated electronic marketplaces*, in *Agent Mediated Electronic Commerce (IJCAI Workshop)*, 24-39, 1999.

Lechner, U. and Schmid, B. F. (2001), *Communities - business models and system architectures: The blueprint of mp3.com, napster and gnutella revisited*, in Sprague, R. H. (Ed.) *Proceed-*

ings of the 34th Hawaii International Conference on System Sciences (HICSS'01). IEEE Press, April 2001.

Schmid, B. F. (1997), *The Concept of Media*, in Lee, R., et al. (Eds.) *Proceedings of the Fourth Research Symposium on Electronic Markets: Negotiation and Settlement in Electronic Markets*, Maastricht (NL), Erasmus Universität Rotterdam, Euridis Conference, 1997, 09.97

Schmid, B. F. and Zimmermann, H.-D. (1998), *Business media: A new perspective on creating value in the information age*, in *Proceedings of the 12th biennial conference of the In-*

ternational Telecommunications Society (IST 1998), Stockholm, June 1998.

Simon, H. A. (1959), *Theories of decision-making in economics and behavioral sciences*, American Economic Review, 22, 253–283.

Youll, J. E. (2001), *Peer to peer transactions in agent-mediated electronic commerce*. Master's thesis, MIT, Cambridge, Boston, August 2001. S.M. thesis submitted to the Program in Media Arts and Sciences.